Species at Risk Act
Action Plan Series

Action Plan for the False Hop Sedge (*Carex lupuliformis*) in Quebec

False Hop Sedge

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[1] http://registrelep-sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of action plans for species listed as Extirpated, Endangered, and Threatened for which recovery has been deemed feasible. They are also required to report on progress five years after the publication of the final document on the SAR Public Registry.

Under SARA, one or more action plan(s) provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines what needs to be done to achieve the population and distribution objectives (previously referred to as recovery goals and objectives) identified in the recovery strategy, including the measures to be taken to address the threats and monitor the recovery of the species, as well as the proposed measures to protect critical habitat that has been identified for the species. The action plan also includes an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation. The action plan is considered one in a series of documents that are linked and should be taken into consideration together. Those being the COSEWIC status report, the recovery strategy, and one or more action plans.

The Minister of the Environment is the competent minister under SARA for the False Hop Sedge and has prepared this action plan to implement the recovery strategy, as per section 47 of SARA. To the extent possible, it has been prepared in cooperation with the Government of Quebec (ministère du Développement durable, de l'Environnement et de la Lutte contre les Changements Climatiques - MDDELCC).

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this action plan and will not be achieved by Environment Canada, or any other jurisdiction, alone. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the False Hop Sedge and Canadian society as a whole.

Implementation of this action plan is subject to the appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

[2] http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2

Acknowledgments

This action plan was prepared by Vincent Carignan (Environment Canada, Canadian Wildlife Service – Quebec region) with the collaboration of Stéphanie Pellerin (Institut de recherche en biologie végétale, Université de Montréal), Patricia Désilets and Jacques Labrecque (MDDELCC), as well as Charles Latour[3], Alain Branchaud and Karine Picard (Environment Canada, Canadian Wildlife Service – Quebec region).

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Executive summary

This action plan complements the Recovery Strategy for the False Hop Sedge (*Carex lupuliformis*) in Canada (Environment Canada 2014). The proposed recovery measures seek to implement the broad strategies and approaches to recovery set out in the recovery strategy for populations and suitable habitat in Quebec. A separate action plan will be prepared for populations and suitable habitat in Ontario.

Critical habitat for False Hop Sedge was partially identified in the recovery strategy, and a schedule of studies leading to the potential identification of additional critical habitat for the Rivière aux Serpents occurrence (near Oka) has been established. The present action plan incorporates that aspect into the development of the recovery actions to be taken and therefore does not identify any additional critical habitat at this time.

Critical habitat for False Hop Sedge is located entirely on non-federal land. Proposed measures to protect critical habitat are presented in section 1.4.

A schedule that establishes the implementation priorities for the recovery measures addresses the following general strategies for the species' recovery in Quebec : 1) conservation of the species, its suitable habitat and the adjacent riparian zone; 2) surveys and monitoring; 3) research; and 4) communication and outreach.

A socio-economic cost-benefit evaluation for implementing this action plan is presented. Low to moderate social and economic impacts as well as limited additional constraints associated with land use are expected. The direct implementation costs are estimated to be close to $240,000 for the 2014–2019 period.

Table of Contents

Preface i
Acknowledgments ii
Executive summary iii
Table of Contents iv
1. Recovery Actions 1
1.1 Context and Scope of the Action Plan 1
1.2 Measures to be Taken and Implementation Schedule 2
1.3 Critical Habitat 5
1.3.1 Identification of the Species' Critical Habitat in Quebec 5
1.3.2. Examples of Activities Likely to Destroy Critical Habitat 5
1.4 Proposed Measures to Protect Critical Habitat 5
1.4.1 Proposed Protection Measures on Non-federal Land 5
2. Socio-Economic Evaluation 6
2.1 Costs 6
2.1.1 Direct costs 6
2.1.2 Indirect costs 7
2.2 Benefits 7
2.3 Conclusion 9
3. Measuring Progress 9
4. References 10
Appendix A: Effects on the Environment and Other Species 13

1. Recovery Actions

1.1 Context and Scope of the Action Plan

False Hop Sedge (*Carex lupuliformis*) is an herbaceous perennial in the sedge family that grows in tufts on the margins of certain freshwater wetlands (swamps, marshes, floodplains). The species was assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2000 and that status was confirmed during the reassessment in 2011. The species has been listed as Endangered on Schedule 1 of the *Species at Risk Act* (SARA) since 2003. In Quebec, the species has been listed as Threatened under the *Act respecting threatened or vulnerable species* since 1998.

False Hop Sedge has a sporadic distribution in eastern North America and is at the northern limit of its range in Canada, where it occurs solely in southern Ontario and Quebec. There are currently 20 known populations (extant, historical or extirpated), 12 of which contain naturally occurring individuals in suitable habitat. Of the remaining eight, transplantations have been conducted at 4 populations to increase the number of individuals, and reintroductions have taken place in 2 other populations that were considered extirpated (extinct). In 2009–2010, there were approximately 361 tufts of False Hop Sedge in 14 extant populations. The latest data is available at the Centre de données sur le patrimoine naturel du Québec (CDPNQ, 2014).

The main threats to False Hop Sedge include the alteration of the water regime, canopy closure, invasive alien plant species, recreational and landowner activities, parasites, garbage disposal and residential development.

The objective of the action plan for the False Hop Sedge is to implement the Recovery Strategy for the False Hop Sedge (*Carex lupuliformis*) in Canada (Environment Canada 2014), whose population and distribution objective are to maintain or, where biologically and technically feasible, increase the species' abundance and area of occupancy in Canada. It complements the *False Hop Sedge conservation plan (Carex lupuliformis)* (Jolicoeur and Couillard 2006) released by the Government of Quebec, which identifies the seven occurrences in the province as priorities for conservation of the species. This action plan applies only to Quebec populations; Ontario populations are addressed in a separate action plan.

1.2 Measures to be Taken and Implementation Schedule

The recovery actions indicated in Table 1 complement the broad strategies and approaches to recovery identified in the recovery strategy. The implementation schedule indicates the priority (high, medium, low) for each measure and the threats or concerns addressed.

Table 1. Implementation Schedule.

#	Recovery Measure	Priority[4]	Threats or concerns addressed[5]	Timeline
Broad Strategy: Conservation of the species, its suitable habitat and the adjacent riparian zone				
	Approach: Implement legislative and stewardship measures within the occurrences and adjacent zones to reduce the effects of the main threats			
1	Continue conservation efforts for the five occurrences located in the proposed Samuel-de-Champlain biodiversity reserve	High	All	2014–2019
2	Initiate conservation efforts for the Saint-Blaise-sur-Richelieu population	High	All	2014–2019
3	Ensure the conservation of the suitable habitat for the occurrences at the Île de Carillon and at the Rivière aux Serpents and reintroduce individuals if deemed necessary	High	All	2014–2019
4	Continue the project to map exceptional forest ecosystems and to facilitate their integration in land use management, particularly at the Saint-Blaise-sur-Richelieu, Lacolle and Baie-des-Anglais occurrences	High	All	2014–2019
5	Reduce or eliminate practices that are incompatible with the maintenance of the species at each population and in each surrounding area	High	All	2014–2019
	Approach: Maintain and/or implement management approaches aimed at increasing the abundance of the species and the area of suitable habitat			

[4] The term "priority" reflects the degree to which the action contributes directly to the recovery of the species or is an essential precursor to an action that contributes to the recovery of the species.

[5] Refers to the threats and limiting factors identified in the recovery strategy: 1) alteration of the water regime, 2) canopy closure, 3) competition with invasive alien plant species, 4) recreational and landowner activities, 5) parasites, 6) garbage disposal, 7) residential development, 8) knowledge gaps in the biology and demographics of the species, and 9) small size of the population and limited number of populations.

#	Recovery Measure	Priority[4]	Threats or concerns addressed[5]	Timeline
6	Increase the size of natural populations through transplants	High	All	2014–2019
7	Undertake *ex situ* conservation efforts (seed banks at the botanical garden)	Low	All	2014–2019
8	Restore habitat when technically feasible	Low	All	2014–2019
9	Carry out reintroductions in historical or extirpated populations where such efforts have not previously been carried out when habitat can be restored	Low	All	2016–2018
Broad Strategy: Surveys and monitoring				
	Approach: Develop and implement a standardized survey and monitoring protocol to collect comparable data in Ontario and Quebec			
10	Mark all individuals (natural, reintroduced or transplanted) and monitor them in order to clarify population dynamics and identify population trends	High	8	2014–2019
11	Continue to collect georeferenced data on tufts of False Hop Sedge and their areas of occupancy and forward the data to CDPNQ	High	8	2014–2019
12	Characterize and monitor the impact of the main threats to the species' survival at each population	High	All	2014–2019
13	Characterize the Rivière aux Serpents population (Oka)	High	8	2014–2015
	Approach: Conduct a survey of suitable habitat outside known populations at regular intervals			
14	Conduct a survey of suitable habitat near extant and extirpated occurrences at regular intervals (at least every 10 years).	Medium	8	2014–2019
15	Look for suitable habitats in relatively unexplored sectors, such as the upstream portion of the Ottawa River and the shores of the St. Lawrence River, and determine whether the species is present	Medium	8	2014–2019
Broad Strategy: Research				
	Approach: Develop techniques designed to increase the vigour and survival of transplants			
16	Pursue efforts to develop effective artificial propagation techniques	Medium	9	2014–2019
	Approach: Study the population dynamics			
17	Determine the minimum viable population size	High	8	2014–2019
18	Study seed viability and longevity in the soil	Medium	8	2014–2019

#	Recovery Measure	Priority[4]	Threats or concerns addressed[5]	Timeline
19	Determine how seed dispersal influences population dynamics	Medium	8	2014–2019
	Approach: Study the genetic aspects of the species that could limit our recovery capabilities			
20	Determine whether hybridization occurs between False Hop Sedge and Hop Sedge (*Carex lupulina*) and determine to what extent the abundance of False Hop Sedge is affected	Low	8	2014–2019
21	Study the degree of genetic variation between and within populations	Low	8	2014–2019
Broad Strategy: Communication and partnerships				
	Approach: Develop and implement a communications strategy aimed at partner agencies, interested groups, private landowners and the general public			
22	Promote exchanges between partners (scientists, recovery teams and implementation groups, NGOs, governments at different levels, general public, private landowners) through annual meetings, citizen information nights, etc.	High	All	2014–2019
23	Promote the engagement of the general public and land use management decision-makers (municipality, RCM, regional conference of elected officials) in the conservation of the species through targeted meetings, brochures, non-technical articles, websites, etc.	Medium	All	2014–2019
24	Continue outreach activities for riparian landowners using tools such as pamphlets, non-technical articles, websites, conservation maps, habitat suitability indices for riparian strips, landowners' workbooks, annual information evenings, etc.	Medium	1, 2, 3, 4	2014–2019

1.3 Critical Habitat

1.3.1 Identification of the Species' Critical Habitat in Quebec

The critical habitat of False Hop Sedge was partially identified in the recovery strategy based on exhaustive surveys of extant and historical occurrences conducted primarily by the Université de Montréal's Institut de recherche en biologie végétale and the Montreal Botanical Garden (Bachand-Lavallée and Pellerin 2006; Letendre et al. 2007). In Quebec, all seven critical habitat units occur in silver maple swamps. Six of the critical habitat units contain individuals whereas the seventh still contains suitable habitat but is not currently colonized by the False Hop Sedge.

The recovery strategy set out a schedule of studies leading to the possible identification of a critical habitat unit for the Rivière aux Serpents occurrence (near Oka). Since recent exhaustive surveys of the suitable habitat in this sector have not shown the presence of the species (Frédéric Coursol and Stéphanie Pellerin, personal communications), this action plan takes this aspect into account in the development of the recovery measures to be taken and therefore does not identify any additional critical habitat at this time. A future action plan (or amendment to the present action plan) could clarify if the identification of additional critical habitat is required for reintroduction of individuals within this occurrence.

1.3.2. Examples of Activities Likely to Destroy Critical Habitat

Examples of activities likely to result in destruction of critical habitat for the False Hop Sedge may be found section 7.2 of the recovery strategy (Environment Canada 2014).

1.4 Proposed Measures to Protect Critical Habitat

1.4.1 Proposed Protection Measures on Non-federal Land

In Quebec, False Hop Sedge critical habitat is located exclusively on non-federal land. Environment Canada will work closely with the province of Quebec to determine whether provincial acts and regulations afford protection to False Hop Sedge critical habitat on non-federal land under SARA. If these measures are deemed to afford effective protection of False Hop Sedge critical habitat under SARA, no part of the species' critical habitat would remain unprotected. If it is determined that any portion of the species' critical habitat remains unprotected, the steps taken to ensure its protection will have to be reported under section 63 of SARA and posted on the Species at Risk Public Registry.

2. Socio-Economic Evaluation

SARA requires that an action plan include an evaluation of the socio-economic costs and benefits to be derived from its implementation (*Species at Risk Act* 2003). The protection and recovery of species at risk can result in both benefits and costs. The Act recognizes that "*wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons.*" Self-sustaining and healthy ecosystems with their various elements intact, including species at risk, contribute positively to the livelihoods and the quality of life of all Canadians. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves. Actions taken to preserve a species, such as habitat protection and restoration, are also valued. In addition, the more an action contributes to the recovery of a species, the more the public values that action (Loomis and White 1996; Fisheries and Oceans Canada 2008). The conservation of species at risk is an important component of the Government of Canada's commitment to conserving biological diversity under the international *Convention on Biological Diversity*. The Government of Canada has also made a commitment to protect and recover species at risk through the National Accord for the Protection of Species at Risk.

This section evaluates the potential socio-economic costs of the action plan and the possible benefits to be derived from its implementation.

2.1 Costs

2.1.1 Direct costs

The action plan for the False Hop Sedge in Quebec describes the recovery actions to be taken to achieve the population and distribution objectives as established in the recovery strategy for the species. Table 2 presents the breakdown of the anticipated direct costs as a function of the four broad recovery strategies[6]. These costs are estimated for the 2014 to 2019[7] period and include, among other things, procurement, salaries, volunteer time, travel and equipment.

[6] Table 2 presents a compilation of the estimated costs for each activity in Table 1. They were determined by consulting the main stakeholders in the species' conservation. Given that stakeholder efforts are often directed at several species or, more generally, at habitat, the costs presented cannot be entirely attributable to False Hop Sedge.

[7] Pursuant to section 55 of SARA, the progress made towards meeting the objectives described in the action plan must be assessed, and a report must be produced on its implementation and its ecological and socio-economic impacts five years after the plan comes into effect.

Table 2. Estimate of direct costs of the implementation of False Hop Sedge recovery measures for 2014–2019.

Broad Strategy	Priority	Government (federal and provincial)	Other Stakeholders
Conservation of the species, its suitable habitat and adjacent riparian zone	High	$150,000 (90%)	$15,000 (10%)
Surveys and monitoring	High	$5,000 (33%)	$10,000 (67%)
Research	High	$15,000 (50%)	$15,000 (50%)
Communication and outreach	Medium	$15,000 (50%)	$15,000 (50%)
		$185,000	$55,000
		$240,000	

2.1.2 Indirect costs

The indirect costs represent potential restrictions on non-economic uses of the species or area it occupies that are associated with the implementation of the recovery actions. Specifically, hunters will have to be more careful not to trample plants, and ATV users will have to reassess their routes for the same reason. Riparian property owners will have to ensure that they comply with the restriction on shoreline development under the *Act respecting the boundaries of the waters in the domain of the State and the protection of wetlands along part of the Richelieu River.*

2.2 Benefits

Many of the benefits derived from the implementation of the action plan are non-market benefits. To ensure the maintenance of biological diversity, the ecosystems with which species are associated must be healthy and intact. These conditions are also important in the delivery of the various ecosystem services. Although it is difficult to assign a value to these benefits, studies conducted around the world have demonstrated that they make a significant economic contribution to the economy (Barbier and Heal 2006; Almack and Wilson 2010). Moreover, a meta-analysis by Balmford et al. (2002) estimates that the cost-benefit ratio of effective programs for the conservation of wild nature is 100:1. In terms of the individual importance of a species, it varies depending on a number of factors, including the year, location and functions considered (Isbell et al. 2011). The significant contribution of biological diversity to ecological services to ensuring the current and future economic and environmental health of Canada would therefore justify the application of the precautionary principle in order to maintain and recover species at risk.

False Hop Sedge has intrinsic value and is important to Canada's natural heritage. As stated in the *Canada Gazette* (2007), Canadians want to preserve species for future generations even if they will never personally see or use them. Moreover, few studies have been conducted on this species (Bachand-Lavallée and Pellerin 2006; Letendre et al. 2007; Lafleur 2009), making the species of interest to botanists.

There is apparently no direct economic value attached to False Hop Sedge (for consumption purposes). However, a number of studies on the economic valuation of biodiversity conservation estimate the annual amount a person is willing to pay for the preservation of ecosystems associated with inland waters, such as rivers and wetlands, at $19.52 (in 2005 US dollars) (Martin-Lopez et al. 2007). False Hop Sedge is a species that is characteristic of the wetlands and riparian habitats of southern Quebec. These areas are recognized as being highly productive and as supporting an exceptional diversity of species (Government of Quebec 2010). Accordingly, many species at risk and a number of species associated with wetlands occur in these areas. In addition, hunters and trappers benefit from this high biodiversity since various species of dabbler and diving ducks as well as muskrats can be observed in these areas (Ducks Unlimited 2006; Government of Quebec 2010).

False Hop Sedge occurs at the edges of wetlands dominated by silver maple, forming a riparian strip (Jolicoeur et al. 2006). These wetlands play an important role in filtering water, regulating the temporal distribution of waters during low flows and limiting erosion (Kort et al. 1998; PRDIRT 2010; Barden et al. 2007). In addition, by gradually releasing water, wetlands contribute to reducing the magnitude of low flows and their impacts, particularly on fish habitat (Limoges 2009). Presumably, the ecosystem services[8] derived from wetlands contribute to the economy of the regions in which they are located since, without them, municipalities would have to increase their spending on filtration plants. For instance, the floods that occurred in Montérégie in 2011 would no doubt have resulted in higher costs. In addition, the conservation and recovery of the stream strips could benefit local farmers by allowing for regulation of the microclimate and increasing the yield of corn grain and soybean crops (Hernandez et al. 2007). The riparian strips would also have the capacity to regulate agricultural pests and diseases, which would reduce the economic costs associated with production losses and pesticide purchases (Limoges 2009). Finally, riparian strips can support pollinating insects, whose contribution to the agricultural economy of the United States is estimated at $14 billion annually (Limoges 2009).

[8] The commonly accepted definition of ecosystem services is that of the Secretariat of the Convention on Biological Diversity (SCBD). Ecosystem services are the benefits people obtain from ecosystems without having to act to get them. There is a distinction between ecosystem functions and services. Ecosystem functions are the natural processes of ecosystem functioning and maintenance, whereas ecosystem services are the result of those functions. The Millennium Ecosystem Assessment (2005) identifies four broad categories of ecosystem services, i.e., regulating services, supporting services, cultural services and provisioning services.

2.3 Conclusion

The implementation of all recovery actions proposed in this action plan would result in direct costs of close to $240,000 for the 2014–2019 period. The action plan is expected to have low-to-medium social and economic impacts in the targeted sectors, with few additional constraints associated with land use. The implementation of this action plan will also contribute in a measurable way to the achievement of the Federal Sustainable Development Strategy for Canada (Environment Canada 2010). Finally, the action plan provides an opportunity for municipalities in the Montérégie and Laurentides regions to implement sustainable ecosystem management for the benefit of future generations.

3. Measuring Progress

The performance indicators presented in the associated recovery strategy propose a means of determining and measuring the progress made towards the achievement of the population and distribution objectives.

An action plan implementation report, under section 55 of SARA, will be produced through the assessment of progress, with a view to implementing the broad strategies.

A report on the ecological and socio-economic impacts of the action plan, under section 55 of SARA, will be produced through an assessment of the results of the monitoring of the species recovery long-term viability and an evaluation of the implementation of the action plan.

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Appendix A: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or achievement of any of the Federal Sustainable Development Strategy's[9] (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of action plans may inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the action plan itself, but are also summarized below in this statement.

The potential for the action plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this action plan will clearly benefit the environment and will not entail any significant adverse effects.

The recovery actions proposed in this document should not have any negative impacts on other non-target indigenous species, natural communities or ecological processes. The protection of critical habitat may even prove to be beneficial for other species at risk that share the floodplain habitat of False Hop Sedge. These include four fish species—the Eastern Sand Darter (*Ammocrypta pellucida*; SARA status: Threatened), Channel Darter (*Percina copelandi*; SARA status: Threatened), River Redhorse (*Moxostoma carinatum*; SARA status: Special Concern), and Grass Pickerel (*Esox americanus vermiculatus*; SARA status: Special Concern)—as well as a number of threatened or vulnerable plant species designated by the Quebec government.

[9] www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1